Medicine Lodge Subbasin Assessment and TMDLs

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Abbreviations, Acronyms, and Symbols

303(d)	Refers to section 303 subsection (d) of the Clean Water Act, or a list of impaired water bodies required by this section
µ	micro, one-one thousandth
§	Section (usually a section of federal or state rules or statutes)
ADB	assessment database
AWS	agricultural water supply
BAG	Basin Advisory Group
BLM	United States Bureau of Land Management
BMP	best management practice
BOD	biochemical oxygen demand
BOR	United States Bureau of Reclamation
Btu	British thermal unit
BURP	Beneficial Use Reconnaissance Program
C	Celsius
CFR	Code of Federal Regulations (refers to citations in the federal administrative rules)
cfs	cubic feet per second
cm	centimeters
CW	cold water
CWA	Clean Water Act
CWE	cumulative watershed effects
DEQ	Idaho Department of Environmental Quality
DO	dissolved oxygen
DOI	U.S. Department of the Interior
DWS	domestic water supply
EMAP	Environmental Monitoring and Assessment Program
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
F	Fahrenheit
FPA	Idaho Forest Practices Act
FWS	U.S. Fish and Wildlife Service
GIS	Geographical Information Systems
HUC	Hydrologic Unit Code
I.C.	Idaho Code
IDAPA	Refers to citations of Idaho administrative rules
IDFG	Idaho Department of Fish and Game
IDL	Idaho Department of Lands

IDWR Idaho Department of Water Resources

INFISH The federal Inland Native Fish Strategy

IRIS Integrated Risk Information System

km kilometer

km^2 square kilometer

LA load allocation

LC load capacity

m meter

m^3 cubic meter

mi mile

mi^2 square miles

MBI macroinvertebrate biotic index

MGD million gallons per day

mg/l milligrams per liter

mm millimeter

MOS margin of safety

MWMT maximum weekly maximum temperature

n.a. not applicable

NA not assessed

NB natural background

nd no data (data not available)

NFS not fully supporting

NPDES National Pollutant Discharge Elimination System

NRCS Natural Resources Conservation Service

NTU nephlometric turbidity unit

ORV off-road vehicle

ORW Outstanding Resource Water

PACFISH The federal Pacific Anadromous Fish Strategy

PFC proper functioning condition

PCR primary contact recreation

ppm part(s) per million

QA quality assurance

QC quality control

RBP rapid bioassessment protocol

RDI DEQ's river diatom index

RFI DEQ's river fish index

RHCA riparian habitat conservation area

RMI DEQ's river macroinvertebrate index

RPI DEQ's river physiochemical index

SBA subbasin assessment

SCR secondary contact recreation

SFI DEQ's stream fish index

SHI DEQ's stream habitat index

SMI DEQ's stream macroinvertebrate index

SRP soluble reactive phosphorus

SS salmonid spawning

SSOC stream segment of concern

STATSGO State Soil Geographic Database

TDG total dissolved gas

TDS total dissolved solids

T&E threatened and/or endangered species

TIN total inorganic nitrogen

TKN total Kjeldahl nitrogen

TMDL total maximum daily load

TP total phosphorus

TS total solids

TSS total suspended solids

t/y tons per year

U.S. United States

USC United States Code

USDA United States Department of Agriculture

USDI United States Department of the Interior

USFS United States Forest Service

USGS United States Geological Survey

WAG Watershed Advisory Group

WBAG *Water Body Assessment Guidance*

WBID water body identification number

WET whole effluence toxicity

WLA waste load allocation

WQLS water quality limited segment

WQMP water quality management plan

WQRP water quality restoration plan

WQS water quality standard

Executive Summary

The federal Clean Water Act (CWA) requires that states and tribes restore and maintain the chemical, physical, and biological integrity of the nation's waters (33 USC § 1251.101). States and tribes, pursuant to section 303 of the CWA are to adopt water quality standards necessary to protect fish, shellfish, and wildlife while providing for recreation in and on the waters whenever possible. Section 303(d) of the CWA establishes requirements for states and tribes to identify and prioritize water bodies that are water quality limited (i.e., water bodies that do not meet water quality standards). States and tribes must periodically publish a priority list of impaired waters, currently every two years. For waters identified on this list, states and tribes must develop a total maximum daily load (TMDL) for the pollutants, set at a level to achieve water quality standards. This document addresses the water bodies in the Medicine Lodge Subbasin that have been placed on what is known as the "303(d) list."

This subbasin assessment and TMDL analysis has been developed to comply with Idaho's TMDL schedule. This assessment describes the physical, biological, and cultural setting; water quality status; pollutant sources; and recent pollution control actions in the Medicine Lodge Subbasin located in southeastern Idaho. The first part of this document, the subbasin assessment, is an important first step in leading to the TMDL. The starting point for this assessment was Idaho's current 303(d) list of water quality limited water bodies. Five segments of the Medicine Lodge Subbasin were listed on this list. The subbasin assessment portion of this document examines the current status of 303(d) listed waters, and defines the extent of impairment and causes of water quality limitation throughout the subbasin. The loading analysis quantifies pollutant sources and allocates responsibility for load reductions needed to return listed waters to a condition of meeting water quality standards.

Subbasin at a Glance

The Medicine Lodge Watershed is located in southeastern Idaho and is approximately 872 square miles in size bordering Montana to the north. The northern half of the hydrologic unit code (HUC) is rurally occupied with about one person for every two acres. The southern half of the HUC has a higher population, but does not contain any of the flowing streams of Medicine Lodge or its tributaries. Medicine Lodge sinks and is diverted very soon after the town of Small, Idaho. Crooked Creek, Warm Springs Creek, and Deep Creek are not tributaries of Medicine Lodge Creek, but flow independently in drainages to the west of Medicine Lodge. These streams also sink before reaching another water body.

Three species of salmonids have been documented in the watershed. Rainbow trout, brook trout and Yellowstone cutthroat trout are all found throughout Medicine Lodge Creek and its tributaries. The Yellowstone cutthroat trout is considered a state sensitive species and is carefully managed by the Idaho Department of Fish and Game (IDFG). Warm Springs Creek contains some warm water species of fish.

Medicine Lodge Creek's designated beneficial uses include salmonid spawning, coldwater biota, primary contact recreation, domestic water supply and special resource water. Edie Creek, Irving Creek and Fritz Creek are all protected for cold water, salmonid spawning and secondary contact recreation. Warm Springs Creek does not have any designated beneficial

uses. Assessments by the Idaho Department of Environmental Quality (DEQ) have identified that water quality is limited on five of the streams in the subbasin.

The DEQ has collected data throughout the subbasin and it has been determined that sediment and temperature are the primary pollutant of concern. TMDLS for sediment have been developed for Medicine Lodge Creek, Fritz Creek, and Irving Creek. Sediment load reductions are quantified through streambank erosion inventories that estimate erosion based on streambank conditions documented along the private land of the 1998 303(d) listed streams. Instream sediment targets have been identified from literature values that are supportive of salmonid spawning and cold water aquatic life. These target values will be used to track the progress of streambank recovery and determine the need for additional management practices to improve water quality.

Temperature TMDLs have been developed for all streams where thermograph data has been collected to support salmonid spawning and CWAL within those streams. Salmonid spawning has been determined an existing use for streams within the Medicine Lodge Subbasin, except for Warm Springs Creek, Divide Creek, Deep Creek, and the lower portion of Medicine Lodge Creek, due to the presence of cold water fisheries.

Nutrient TMDLs will not be written for the streams in the Medicine Lodge Subbasin since there is no observational or collected data indicating nutrient enrichment in any part of the watershed.

Medicine Lodge Creek Subbasin at a Glance:		
Hydrologic Unit Code	17040215	
1998 Water Quality Limited Segments	Edie Creek Fritz Creek Warm Springs Creek	Irving Creek Medicine Lodge Creek
Beneficial Uses Affected	Cold Water Aquatic life Salmonid Spawning Primary Contact Recreation Secondary Contact Recreation Domestic Water Supply Special Resource Water	
Pollutants of Concern	Sediment, Temperature, Nutrients, Flow Alteration Habitat Alteration	
Major Land Uses	Grazing, Irrigated Agriculture, Dryland Farming	
Area	872 mi^2	
Population (1999 Clark County)	913	

Key Findings

- The Medicine Lodge Subbasin has no known point sources of pollution within its boundaries. Sources of non-point source pollution consist of land disturbance from grazing, unmaintained roads, farming, recreation, diversions, and river adjustments after a large flooding event in 1995. The primary water quality concern within the Medicine Lodge Subbasin is related to subsurface fine sediment deposited within the stream substrate, which is likely impacting the abundance and quality of fish habitat. The primary source of sediment appears to be streambank erosion. The primary cause of streambank erosion is related to the downcutting of the stream channel and the subsequent sloughing of streambanks.

- Streambank erosion in Medicine Lodge is primarily occurring due to animal access. The majority of the watershed is used for rangeland, with few sections of riparian buffer fenced for protection. Other sources of streambank erosion are the road crossings, poor irrigation diversion gates and other upsets to the hydrologic regime. Many areas of the Medicine Lodge watershed are re-establishing a flood plain. This process will likely take many years and will result in much additional streambank erosion. Riparian vegetation will likely re-establish on outside bends in which it is absent as the re-stabilization process takes place. Additionally, as riparian conditions improve over the listed reaches in the Medicine Lodge Subbasin, the added benefit of reduced thermal loading will likely be realized and the temperature regime in these streams will likely improve. The Idaho Association of Soil Conservation Districts has also been awarded a grant to replace several of the dysfunctional diversion gates in the subbasin, which will decrease the impact they have on the area.

- The majority of the roads along Medicine Lodge Creek are paved with bridges over stream crossings that are maintained by the county. However, there are several portions of the stream, which are severely encroached by the road causing a disturbance of the natural hydrology which can cause excessive sedimentation downstream. The road up Edie Creek is a dirt road, with six undeveloped road crossings on the BLM land in the upper portions of the creek while Irving Creek has no undeveloped road crossings. These road crossings on Edie Creek and the streambank instability caused by animal access on both streams are the main sources of excess sediment.

- A numerical target has been set for sediment throughout the subbasin. The goal of the sediment TMDLs developed in Medicine Lodge is to improve the quality of spawning and incubation of substrate and rearing habitat for trout. The subsurface fine sediment target is less than or equal to 28% fine particles <6.35 (0.25 in) sediment, not including substrate larger than 63.5mm (2.5 in), in potential or known salmonid spawning habitat. This percentage has been adapted by the DEQ to be capable of supporting salmonid spawning as well as improve other aspects of salmonid spawning habitat. The strategy used to achieve this sediment target is to reduce streambank erosion, which is believed to be the main cause of excessive sedimentation into the watershed.

- The sediment load that can be assimilated by the streams in Medicine Lodge and still meet the State's water quality narrative sediment criteria is unknown. The beneficial use

of salmonid spawning is impacted by sediment loading above the assimilative capacity of the creek. The loading capacity lies somewhere between the current loading level and the sediment loading from natural streambank erosion levels. Cold water aquatic life and salmonid spawning are naturally occurring beneficial uses in Medicine Lodge Creek and its tributaries. We therefore assume that cold water aquatic life and salmonid spawning would be fully supported at natural background sediment loading rates. We also assume that natural streambank stability was equal to or greater than 80% (Overton et al. 1995).

Because the primary chronic source of sediment loading to Edie Creek, Irving Creek and Medicine Lodge Creek is streambank erosion, quantitative allocations are developed. These sediment load reductions are designed to meet the established instream water quality target of 28% or less fine sediment <6.35 mm in areas suitable for salmonid spawning. Streambank erosion reductions are quantitatively linked to tons of sediment per year. An inferential link is identified to show how sediment load allocations will reduce subsurface fine sediment to or below target levels. This link assumes that by reducing chronic sources of sediment, there will be a decrease in subsurface fine sediment that will ultimately improve the status of beneficial uses. Streambank erosion load allocation is based upon the assumption that natural background sediment production from streambanks equates to 80% streambank stability as described in Overton and others (1995), where stable banks are expressed as a percentage of the total estimated bank length. Natural condition streambank stability potential is generally 80% or greater for A, B, and C channel types in plutonic, volcanic, metamorphic and sedimentary geology types.

Based on the streambank erosion inventory of Edie Creek, the estimated total existing sediment load from streambank erosion for the segment on private land is 58.2 tons/mile/year. The estimated sediment load from streambanks that are 80% stable is 36.7 tons/mile/year. A sediment load reduction of 21.5 tons/mile/year is anticipated if 80% or greater streambank stability is achieved. Irving Creek's streambank erosion inventory estimated that the total existing sediment load from streambanks on private land is 251.5 tons/mile/year. The estimated sediment load from streambanks that are 80% stable is 89.6 tons/mile/year. A sediment load reduction of 161.9 tons/mile/year is anticipated if 80% or greater streambank stability is achieved. Based on the streambank erosion inventory of Medicine Lodge Creek, the estimated total existing sediment load from streambank erosion for private land is 83.3 tons/mile/year. The estimated sediment load from streambanks that are 80% stable is 46.0 tons/mile/year. A sediment load reduction of 37.3 tons/mile/year is anticipated if 80% or greater streambank stability is achieved.

It is anticipated that by reducing the chronic sediment load through increased streambank stability, the instream target of 28% subsurface fines will be achieved. If the instream target is attained, the beneficial use of natural spawning by salmonids should eventually be restored to full support. Streambank stability, the percentage of subsurface fines in salmonid spawning habitat and age class structure of salmonids must be monitored every other year to determine the effectiveness of land management activities and of this TMDL.

- The margin of safety (MOS) is factored into load allocations for sediment for Edie Creek, Irving Creek, and Medicine Lodge Creek. The MOS is the conservative assumptions used to develop existing sediment loads, where background conditions are more than needed to attain full support of uses are employed. Conservative assumptions made as part of the sediment loading analysis include: 1) Desired bank erosion rates are representative of background conditions of 80 %, as described in Overton and others ; 2) Water quality targets for percent depth fines of less than 28% (<6.35mm), are consistent with values measured and set by local land management agencies based on established literature values and incorporate a more than adequate level of fry survival to provide for stable salmonid production. It is assumed that the status of beneficial uses will be improved prior to the attainment of the targets of 80 % erosion rates and less than 28% depth fines in this TMDL.

- Streambank erosion is also the cause for increased temperatures throughout the Medicine Lodge Subbasin. Collected thermograph data establishes that Temperature TMDLs are necessary to meet salmonid spawning temperature criteria on all streams except Deep Creek, since there are no fish documented in this stream. Temperature TMDL load reductions were developed by quantifying daily temperature exceedances during spring and fall spawning seasons and dividing the maximum temperature exceeedance collected by the salmonid spawning criteria to get a percent reduction in temperature. Of all streams sampled throughout the subbasin, Deep Creek was the only stream not needing a salmonid spawning temperature TMDL because no fish data exists for this stream. All other streams document the presence of cold water fisheries, therefore Salmonid Spawning is an existing beneficial use.

- Salmonid Spawning temperature targets developed for the Medicine Lodge Subbasin are based on existing numeric criteria of [IDAPA 58.01.02.250(02)].

- The MOS factored into load allocations for water temperature is based on the maximum observed temperature exceedances for each critical time period. Maximum exceedances of the most restrictive criteria were used to identify needed temperature reductions based upon the assumption that if temperature reductions are directed at eliminating the recorded maximum exceedance of criteria, then lesser exceedances will be eliminated during other times of the year.

- The development of an implementation plan for Medicine Lodge Creek Subbasin is currently underway and the draft plan is found in Appendix F. The implementation plan identifies Best Management Practices (BMPs) that will be implemented on streams with TMDLs throughout the subbasin to improve riparian condition and stream channel habitat and reduce streambank erosion. BMPs that will be implemented within the subbasin focus on agricultural irrigation diversions, irrigation efficiency, and prescribed livestock grazing protection.

- The information presented in this subbasin assessment indicated that the development of a total maximum daily load (TMDL) is unnecessary for Warm Springs Creek. Warm Springs Creek is on the 1998 303(d) list for nutrients and sediment and has no designated

beneficial uses. Thermograph data collected on the stream (Figure 44) indicates that the stream is naturally thermal. Only warm water species of fish have been found in the creek, and it is therefore recommended that the stream be designated for warm water aquatic life or seasonal cold water aquatic life.

- It is recommended that TMDLs for nutrients not be written for any of the streams in the watershed. There is no data that indicates excessive slime growth, and there is no observational data present indicating excessive slime growth in any part of the watershed indicating that the listing was in error. Several meetings with the Watershed Advisory Group (WAG) have taken place for the Medicine Lodge Subbasin. These have primarily been informative meetings, keeping the group involved in the pace of TMDL development and allowing time for concerns of the group to be addressed. A minimum of a 30-day public comment period and an additional WAG meeting will take place prior to EPA submittal.

- Although there is a large amount of water quality data for Medicine Lodge, it would be helpful to conduct more electrofishing on Crooked Creek. The USFS found 19 Yellowstone cutthroat trout in the creek in 1997, but did not measure the fish. We do not know how many age classes are present, and therefore cannot assess the health of the population. The DEQ also electrofished Crooked Creek in 1997 and again in 2000, but did not collect any fish.

- Additional streambank erosion inventories should also be conducted on all listed streams. The Soil Conservation Commission conducted a wealth of streambank assessment information including streambank erosion inventories for four of the streams on the 1998 303(d) list. These inventories only included private land, however, and complimentary information should be collected for the upper reaches of these streams.

Table A. Summary of assessment outcomes for which TMDLs were developed.

Water Body Segment	Assessment Units of ID17040215	Pollutant	TMDL(s) Developed	Recommended Changes to 303(d) List	Justification
Crooked Creek Headwaters to sinks	SK021_02 SK021_03	**Temperature**	Yes	Add	Temperature exceedances documented
Deep Creek Headwaters to sinks	SK018_02 SK018_03	**Temperature**	Yes	Add	Temperature exceedances documented
Edie Creek WQLS 2210 Headwaters to ML Creek	SKO10_02	Habitat Alteration	No	None	DEQ Policy
		Nutrients	No	Delist	No excess algal growth documented
		Temperature	Yes	Add	Temperature exceedances documented
		Sediment	Yes	None	

Water Body Segment	Assessment Units of ID17040215	Pollutant	TMDL(s) Developed	Recommended Changes to 303(d) List	Justification
Fritz Creek WQLS 2212 Forks to ML Creek	SK016_02	Nutrients	No	Delist	No excess algal growth documented
		Temperature	Yes	None	Temperature exceedances documented
Horse Creek Headwaters to mouth	SK015_02	**Temperature**	Yes	None	Temperature exceedances documented
Indian Creek Headwaters to Medicine Lodge Creek	SK003_02 SK003_03	**Temperature**	Yes	Add	Temperature exceedances documented
Irving Creek WQLS 2211 Headwaters to ML Creek	SK012_02 SK012_03	Habitat Alteration	No	None	DEQ Policy
		Nutrients	No	Delist	No excess algal growth documented
		Temperature	Yes	Add	Temperature exceedances documented
		Sediment	Yes	None	
Medicine Lodge Creek WQLS 2215 Spring Creek Hollow to Small, ID	SK0006_04	Flow Alteration	No	None	DEQ Policy
		Sediment	Yes	None	
		Temperature	Yes	None	Temperature exceedances documented
Middle Creek Headwaters to Medicine Lodge Creek	SK008_02 SK007-02 SK007_03	**Temperature**	Yes	Add	Temperature exceedances documented
Warm Creek Headwaters to Confluence	SK013_02 SK013_03	**Temperature**	Yes	Add	Temperature exceedances documented
Warm Springs Creek Headwaters to Sinks	SK020_02 SK020_03	Nutrients	No	Delist	No excess algal growth documented
		Sediment	No	Delist	Thermal spring so no violations of CWAL or SS, and depth fines already meeting target of 28%

Water Body Segment	Assessment Units of ID17040215	Pollutant	TMDL(s) Developed	Recommended Changes to 303(d) List	Justification
Webber Creek Headwaters to Medicine Lodge Creek	SK017_02	**Temperature**	Yes	Add	Temperature exceedances documented

Streams shown in bold are streams and pollutants for which a TMDL was developed.